



ASXL1 gene

additional sex combs like 1, transcriptional regulator

Normal Function

The *ASXL1* gene provides instructions for making a protein that is involved in a process known as chromatin remodeling. Chromatin is the complex of DNA and proteins that packages DNA into chromosomes. The structure of chromatin can be changed (remodeled) to alter how tightly DNA is packaged. When DNA is tightly packed, gene activity (expression) is lower than when DNA is loosely packed.

Through its role in chromatin remodeling, the ASXL1 protein regulates the expression of many genes, including a group of genes known as HOX genes, which play important roles in development before birth. The ASXL1 protein can turn on (activate) or turn off (repress) HOX genes depending on when they are needed.

The ASXL1 protein may have an additional role in gene regulation by signaling to molecules to add a methyl group (a process called methylation) to an area near a gene called the promoter region, which controls gene activity. When a promoter region is methylated, gene activity is repressed, and when a promoter region is not methylated, the gene is active.

Health Conditions Related to Genetic Changes

Bohring-Opitz syndrome

At least 18 mutations in the *ASXL1* gene have been found to cause Bohring-Opitz syndrome, a condition characterized by abnormal head size and shape, distinctive facial features, joint abnormalities, intellectual disability, and other signs and symptoms. Most of the *ASXL1* gene mutations that cause Bohring-Opitz syndrome create a premature stop signal in the instructions for making the ASXL1 protein, resulting in an abnormally short, nonfunctional protein. These *ASXL1* gene mutations are described as "loss-of-function" because they reduce the amount of functional ASXL1 protein available, which likely disrupts the regulation of the activity of HOX genes and other genes during development. Altered activity of these genes probably leads to the neurological and physical features of this condition.

cancers

Mutations in *ASXL1* gene have been found to be associated with cancers of blood-forming cells (leukemias), such as acute myeloid leukemia, chronic myelomonocytic leukemia, and myelodysplastic syndrome. These mutations are somatic, which

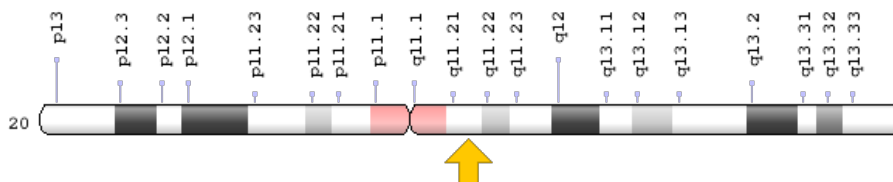
means they are acquired during a person's lifetime and are present only in cells that give rise to cancer.

The mutations associated with cancers are likely "gain-of-function," which means that they lead to an overactive ASXL1 protein. Researchers believe that the overactive ASXL1 protein leads to poor regulation of gene activity. It is unclear how this altered gene regulation plays a role in the development of leukemia, but it is likely that overactive genes promote the growth of cancers by allowing abnormal blood cells to grow and divide uncontrollably.

Chromosomal Location

Cytogenetic Location: 20q11.21, which is the long (q) arm of chromosome 20 at position 11.21

Molecular Location: base pairs 32,358,062 to 32,439,319 on chromosome 20 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- additional sex combs like 1
- additional sex combs like transcriptional regulator 1
- KIAA0978
- putative Polycomb group protein ASXL1 isoform 1
- putative Polycomb group protein ASXL1 isoform 2

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): Chromosomal DNA and Its Packaging in the Chromatin Fiber
<https://www.ncbi.nlm.nih.gov/books/NBK26834/>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28ASXL1%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D>

OMIM

- ADDITIONAL SEX COMBS-LIKE 1
<http://omim.org/entry/612990>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
<http://atlasgeneticsoncology.org/Genes/ASXL1ID44553ch20q11.html>
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=ASXL1%5Bgene%5D>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=18318
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/171023>
- UniProt
<http://www.uniprot.org/uniprot/Q8IXJ9>

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